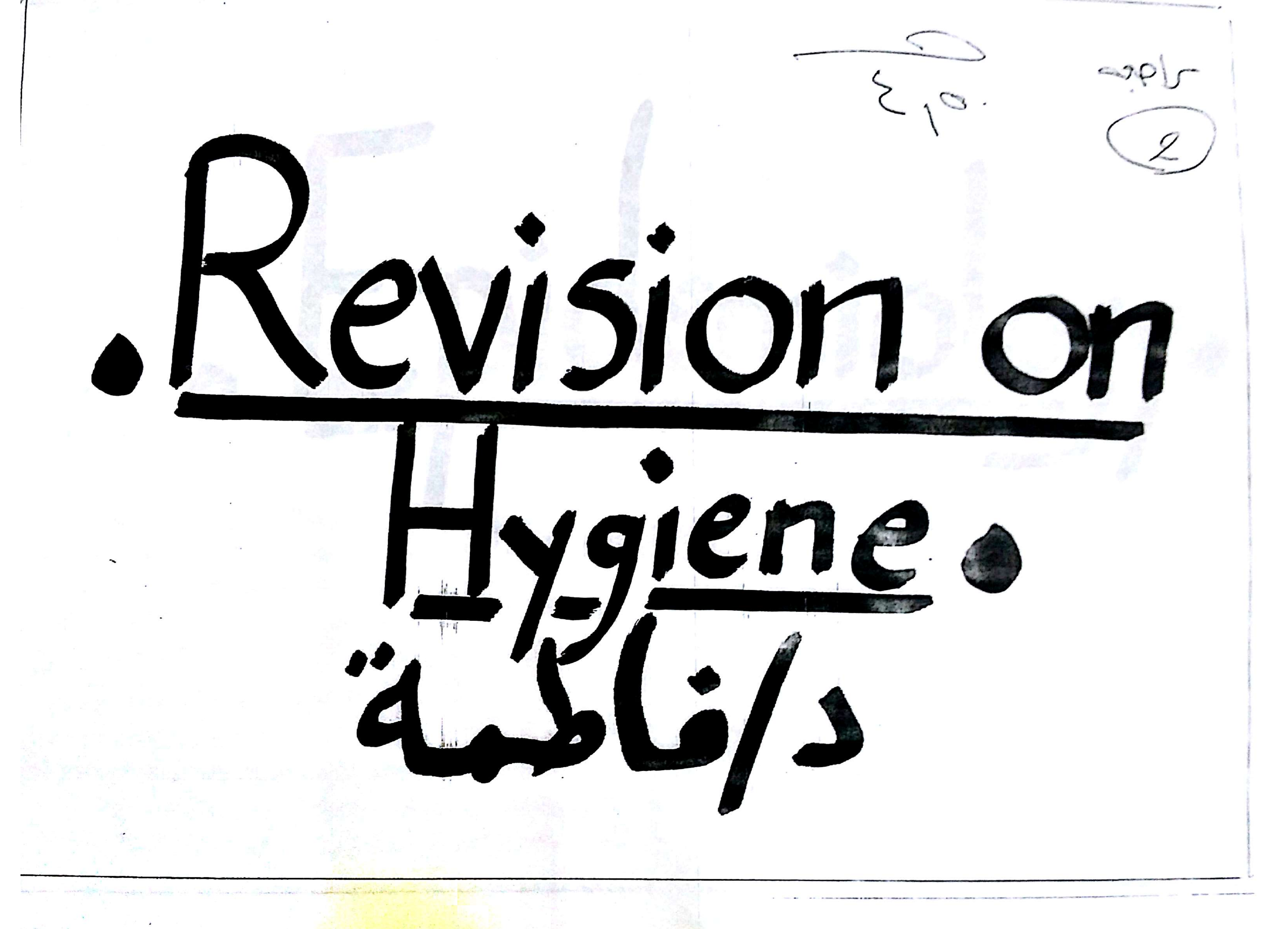
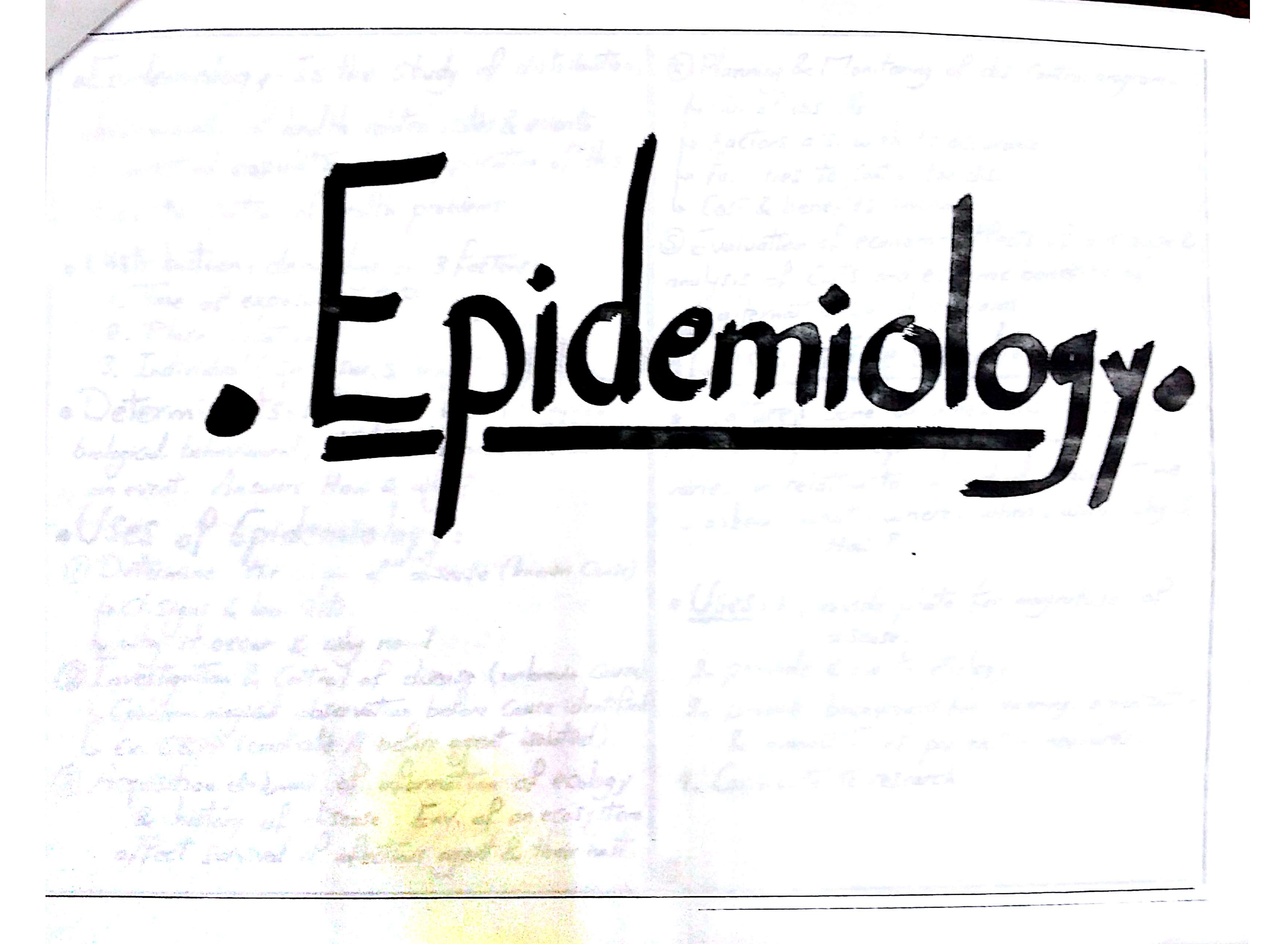


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• Epidemiology •

• **Epidemiology**: Is the study of distribution, determinants of health-related states & events in specified population and application of this study to control of health problems.

• **Distribution**: depending on 3 factors:
1- Time of exposure, I.P
2- Place (location)
3- Individual (Spp., sex, Susceptibility).

• **Determinants**: Etiological factors (physical, biological, behavioural) affect occurance & level of an event. Answers How & why?.

• Uses of Epidemiology:

① Determine the origin of disease (known cause)
↳ Cl. Signs & lab. tests.
↳ why it occur & why no. ↑

② Investigation & Control of disease (unknown cause)
↳ Epidemiological observation before cause identified.
↳ Ex. CBPP (eradicate A before agent isolated).

③ Acquisition التحصيل of information of ecology & history of disease: Env. of an ecosystem affect survival of infectious agent & their host.

④ Planning & Monitoring of dis. Control programs:
↳ No. of dis. A's.
↳ factors ass. with its occurance.
↳ facilities to control the dis.
↳ Cost & benefits involved.

⑤ Evaluation of economic effects of a disease & analysis of costs and economic benefits of alternative control programs.

• Descriptive studies:-

* **Nature**: done on a new dis. to characterize it, quantify its frequency, determine how it varies in relation to individual, place & time.
- asked: what, where, when, who, why & How?

* **Uses**: 1- provide photo for magnitude of disease.
2- provide close to etiology.
3- provide background for planning, organization & evaluation of preventive measures.
4- Contribute to research.

* **Types:**

① Case report	② Case Series	③ Based on rates
* Sequence of events that may suggest previously unsuspected causal relationships. * Can happen once	* Identify common features among multiple cases & describe pattern of variability among them. * Can happen repeatdly.	* Quantify the burden of dis. * Using data from existing sources as birth & death certificates. * rich source of hypothesis.

• Experimental studies:-

* **Nature:** experiments to test epidemiologic hypothesis about effectiveness of preventive measures as vaccine & drug trials.

* **Uses:** 1- provide scientific proof for etiology & risk factors.
2- provide method for measurment of efficacy of therapeutic measures of dis.
3- Measure efficacy of prevention & control.

* **Types:**

① Randomized Clinical Trials (RCT)	② Community trials
* asses efficacy by comparison effect of interaction in study group & control group. * Allocation توزيع of groups to be studied or control → random determined & avoid selection.	* On the level of community instead of random assigning → intervention to entire group. * one group receive TT & other serve as control.
* Basic steps:- 1- following up a protocol. 2. select refrence & experimental population 3- Randomization 4- Intervention 5- following up 6- Assesment of outcome	* Depend on:- 1- Certificates of birth & death. 2- Research trials. 3- Health & education status

• Analytical Studies:-

* Hypothesis → testing for analysis → identify relationship between exposure & outcome.
* Used to refer to any trait, behaviour or environmental factor.

① Case Control Study	Cohort Study
- from effect to Cause	- from Cause to effect
- Start with disease.	- Start with people exposed to risk factors.
- Tests if the suspected factors associated more with diseased.	- Tests if disease occur more in those who exposed to risk factors
- First approach to testing hypothesis.	- Reserved for Precisely formulated hypothesis
- fewer no. of Subjects	- large no.
- Suitable to rare dis.	- inappropriate when exposure is rare.
- estimate odds ratio	- Yields IR, RR, AR.
- Relative Inexpensive	- expensive

Case Control	Cohort
* Advantages: 1- Excellent way to study rare dis. 2- Relatively quick 3- 〃 Inexpensive 4- 〃 require few study ~~for~~ subjects. 5- use existing records. 6- Study many possible causes of disease.	1- Better for studying rare exposure 2- Complete data on cases, stages. 3- Study more than one effect of exposure. 4- Calculate & Compare rates in exposed & non. 5- Choice of factors available to study 6- quality Control of data
* Disadvantages: 1- Relies on recall or existing records about exposure. 2- Difficult or impossible to validate data. 3- Control of extraneous factors incomplete 4- Can't Calculate rates 5- Can't study mechanism of disease.	1- Need to study large number. 2- May take many years. 3- Circumstances may change during study. 4- Expensive 5- Rarely possible to study mechanism of dis. 6- Control of extraneous factors may be incomplete

*** Cohort Studies:**

- Prospective Cohort study
  - begin with 2 groups : one exposed to Cause & other is Control.
  - followed over time & record the change in status.
- Retrospective Cohort study
  - start when all cases identified
  - Evaluate history of each study for evidence of exposure.

③ Ecological Studies: unit of analysis is group of individuals, measures of exposure, measures of outcomes are Compared.

④ Cross-Sectional studies :
- at time
- Random Sample
- Quick to Conduct with moderate Cost.
- Can't provide information on the incidence & difficult to investigate Cause and effect relationship.

⑤ Hybrid Study Design.

• Epidemic Curve :- (basic epidemic theory)

• **Def.** a graph in which the number of new cases of dis. is plotted against an interval of time to describe a specific epidemic or outbreak.

• **Factors affecting shape:**

1- I.P 2- characteristics of agent & host
3- Contact rate 4- population density.

• **Types:-**

① Common point Source epidemic : group exposed over a relatively short period then dis. cases emerge over one I.P.

* E.x . leukemia Case in hiroshima → Curve rise rapidly, definite peak at top, followed by gradual decline

② Propagated epidemic : Case of dis. serve as Source of infection & Subsequent cases serve as Source f. later cases.

** **Interpreting an epidemic Curve:**

1- Very helpful in determining the Source of outbreak.

2- diff. patterns of epidemic curve, help in hypothesize:
- ↳ how an epidemic spread through a population
- ↳ at what point you are in an epidemic.
- ↳ The diagnosis of dis. by establishing the potential I.P.

So, a highly infectious agent with short I.P → Curve with steep initial slope (shift to left) at peracute form of dis. ex. ND, AI

* Diseases with long I.P, low virulence of agent, minimum density → Curve shift to right) ex. T.B, leukosis, Marek's.

• Monitoring epidemic disease in practice occur through:-

[1] Survey:- Counting individuals of an aggregate of units. or groups and measuring of their characteristics.

[2] Surveillance:- monitoring of diseases in population for rapid detection & Control measures.

* Types:
  - ↳ passive: regular reports submitted by practitioners, lab. & hospitals.
  - ↳ Active: action taken by Vet. authorities during disease eradication process (Mass vacination, quarantine, Control movement, Sero-Survey).

* Surveillance Cycle:
  Collect data → organize & analyse → interpret data → Disseminate information → finally takes action.

* Source of Surveillance data:-
  1- Livestock producers & owners.
  2- Individual Vet. practitioners.
  3- Research laboratories, Institutes & universities.
  4- Slaughter houses, artificial insemination centers.
  5- National & international quarantine authorities.

[3] Intensive follow up:-

* detailed multifaceted study of all significant aspects of disease in a population.
* applies for diagnosis of an outbreak on the farm, occurs by describing the outbreak & its Causes.
* follow the study.

(D)

Determinants :- (Causes of dis. occurance)

⇒ **Def.** any factor or variable that can affect directly or indirectly frequency of disease occurance in a population.

⇒ Classification:

① Primary & Secondary determinants:

ⓐ Primary (Specific factors):

- Intrinsic : Causal agent is an integral part of the host. (Hereditary, Metabolic & hormonal disturbance, Behavioral disorders)
- Extrinsic : Causal agent isn't integral part of host. (Non-living agent, Chemical agent, Living agent).

ⓑ Secondary (Predisposing factors):

- Intrinsic : Causal agent is an integral part of host. (Age, Sex, spp., breed & strain, metabolism & hormonal balance, state of nutrition, stress, physiological state, vaccination).
- Extrinsic : factors in the environment. (stocking density, ventillation, env. conditions: temp., humidity, wind velocity ...).

② Epidemiological triad (Epi. triangle or determinants related to epi. triad) :-

ⓐ agent :- Biological, physical or chemical factors whose presence or absence or relative amount (too much or too little) are necessory for dis. occurance.

• Types: living / Non-living

** Agent factors :-

(1) Infectivity : Capacity of an agent to produce dis.
 • measured by 2ndry attack rate.

- Primary infection: first dis. noted in an illness.
- Secondary " : body weak by primary infection, there are many predisposing factors to 2nd infection with same organism.
- Mixed Infection: disease caused by 2 or more organism.

(2) Pathogencity : Capacity of agent to cause disease in infected host.
 • measured by proportion of individuals with clinically apparent disease.

(3) Virulence : refers to severity of disease, measured by proportion of severe or fatal cases.
 • If fatal → use case fatality rate.

ⓑ Host :- an animal which permits lodgment of an infectious dis. agent under normal conditions.

(I) Intrinsic : (1) Spp. : C.a may be specific or multipart spp.

(2) Breed : response to agent differ among breed and races within a given spp. (3) Sex (4) Age

(5) Physiological state.

(II) Extrinsic : Animal use (occupation for man), À performance & Managment.

© **Environment :-** The domains external to the host in which the agent may exist, survive or originate.

* Consists of physical, biologic, social & economic components that affect survival of agent (temp., water, food ....)

(I) Climate,

(1) Macroclimate (weather): Temp., Radiation, Humidity, wind speed....
↳ ex. droplet nuclei (few microns) from infected A can be transported for long distance (50 km or more) favored by rainfall

(2) Microclimate : at the ground or soil suf. where soil is the suitable ecosystem for survival of fungi, ticks...
↳ ex. Nematode larva

(II) Biological Environment:

(1) Man : Vets, Sales men, Visitors. ....
↳ ex. Fowl Plague can be introduced into poultry population by careless laboratory workers.

(2) Wild A's & birds : ex. AI
(3) Micro-organisms, domestic A's & Insects.

• Causation :- (def. & theories)

* Is an event, condition or characteristic which plays an essential role in producing an occurance of the agent has to be present in every case of the disease.

* ① In late 19th Century, koch's postulates brought a degree of order & discipline to the study of infectious diseases, although the key assumption of "one-agent one-disease" was highly restrictive (since it failed to take account of diseases with multiple etiologic factors, multiple effects of single causes, carrier states & non-agent factors such as age & breed).

② Based on John Stuart Mill's rules of inductive reasoning from 1856, Evan developed a Unified Concept of Causation includes the following criteria:

1. proportion of individuals with disease should be higher in those exposed to putative cause السبب المفترض than in those not exposed.
2. Exposure to putative cause should be more common in cases than in those without the dis.
3. Number of new cases should be higher in exposed than non.
4. Disease should follow exposure to putative cause.
5. Should be a measurable biologic spectrum of host responses.
6. The disease should be reproducible experimentally.
7. preventing or modifying the host response should ↓ or eliminate the expression of disease.

⇒ **Theories of disease Causality :-**

(1) 19th Century theories
- Contagion theory
- Supernatural "
- Personal behaviour theory
- Miasma theory.

(2) 20th Century theories
- Germ theory
- lifestyle
- Environmental
- Multi-causal

• Pathogenicity (infectivity, Virulence) of disease depend on :-

[1] Microbial factors:- ability of pathogen to produce dis. through :-

ⓐ Adherence factors: microbes with pilli → adhere to host cell. mucous membrane as E.coli.

ⓑ Invasiveness : ability of organism to invade host tissue, multiply & spread rapidly.

ⓒ Toxigenicity : bacterial products → harmful action on host tissue cell

- ↳ Exotoxins : extracellular toxins, diffuse freely into surrounding media, ex. Cl. tetani & perfringens.
- ↳ Endotoxins : part of bacterial cell wall (E.coli, Salmonella, Shigella, Vibrio cholera).
  - liberated only by disintegration of cell when dies or adding certain acid or alkali.

ⓓ Production of certain enzymes : produced by most of pathogenic bact.

- ↳ Enzymes MW 63 : by all pathogenic Staphylococci
- ↳ Hemolysin & Leukocidin : dissolve RBCs, tissue cells & leukocytes.
- ↳ Fibrinolysin or kinase.

[2] Host resistance factors:-

① Primary defense (innate immunity):

ⓐ Mechanical barriers (skin & M.M)
ⓑ Phagocytes: engulf M.O.
ⓒ Body secretions as gastric secretion (highly acidic), Nasal hair, Saliva, Wave like motion of tracheal cilia.

② 2ndry defense (specific immunity): highly specific agents for specific invaders (parental defense).

[3] Host :

① Definitive host (Final host) : in which, organism undergoes its sexual phase of reproduction (e.g : Coccidia in chicks).

② Primary host : A that maintain infection in edemic areas.
* Infectious agent depend upon primary host for its long term existence.

③ Secondary host : spp. that is involved in life cycle of an agent esp. outside typical endemic areas.

* ═══ * ═══ * ═══ *

Incidence	Prevalence
(No. of new cases / total no. of population) x100	(No. of new & old / total) x100
Propability of developing diseases	already having disease
Numerator → new cases	old & new
not depend on duration of illness	depend

Disease in population

- **population**: Complete Collection of individuals that have Some particular characteristics in Common. It Could be of known size or unknown.
  *from epidemiological point, it is an advantage to know the Size.

- **population at Risk** = enumerated events / population in which events took place

- **Herd Immunity**: resistance of group To invasion & Spread of an infectious agent, based on immunity of high proportions of individuals in the Community.

  * Conditions under which herd immunity best functions:
    1. Single reservoir
    2. Direct transmission
    3. Total immunity
    4. No Carrier state
    5. uniform distribution of immunes
    6. No over crowding.

Disease Occurance*

*(I. Pattern of disease occurance)

① **Sporadic**:- occasional Cases occuring at irregular intervals, occur sporadically.

*Causes:-
1. Existance of infection and only Some A's show signs of dis.
2. Infection is absent & disease noticed when infected A' is introduced.

(10)

3. Infection is maintained in another spp. of A's, interspecies transmission

② **Endemic**: Persistent occurance with a low to moderate level.

* Represent → clustering of dis. events in space but not in time. (native to defined area or place).
* Concerned with both clinical & subclinical in infectious & non-infectious.

  ↳ Holo-endemic : most A's affected.
  ↳ Hyper-endemic : high proportion of A' population affected.
  ↳ Meso-endemic : moderate " " " " "
  ↳ Hypo-endemic : Small proportion of A' affected.

③ **Epidemic / outbreak**: occur in a given population during given time interval in excess of its normally expected frequency of occurance.

  ↳ Point epidemic: A's exposed to common source of infection (e.g: Contamination of water, food, air, fomites)
  ↳ Propagating epidemic: primary Cases secrete the infectious agent & the number affected increase gradually over time.

④ **Pandemic**: epidemic spread over Several Countries affecting large number of people (e.g: AI, Swine flu, FMD...)

Outbreak Investigation

* **Cluster:** an aggregation of cases over a particular period.

* **Public health Surveillance:** systemic collection, analysis, interpretation & dissemination of health data to gain knowledge of pattern of the disease occurance to control & prevent dis.

• Steps of Outbreak Investigation:

[1] Prepare of field work : Investigation → administration → Consultation.

[2] Establish the existence of an outbreak :
- → detect the common cause
- → How department of public health staff would be notified of a possible outbreak.

[3] Verify the diagnosis : Review the clinical findings & summarize it with frequency distributions.

[4] Define & Identify cases :
- → Characteristics shared by all members being defined.
- → What distinguishes them from all outside the members.

* Classification → Confined case / problem case / Suspected case

[5] Perform Descriptive Epidemiology: Time, place & Individuals

[6] Develop hypothesis (theories) : facts are established & accepted as a basis for future investigation.

[7] Evaluate hypothesis : Cohort & Case Control studies

[8] ReConsiders, refine & re-evaluate hypothesis (Sometimes analytic studies are un-relating because of new modes of transmission) and exclude additional studies as laboratory & environmental studies

[9] Implement Control & prevention measures (aim it at specific agent, source or reservoir).

[10] Communication :
- → Surge Capacity worker
- → provide information to other individuals.
- → able to describe what you did, what found, what think about Sanitation.

• Application of Epi. investigation to prevent & Control dis.

1• Levels of Disease Prevention:

[1] Primary prevention :
- → healthy people
- → Promotion of health & prevent exposure to diseases.

[2] Secondary prevention :
- → Sick Individuals
- → Stop or slow progression of dis.
- → early detection & TTT

[3] Tertiary preventio
- → people with chroni disease
- → prevent further disability or death to limit impacts

2. Disease Control Stratigies:

1- Exclusion / Prevention "keep it out of here"
2. Control: keep it in an acceptable level.
3- Eradication: get rid of it.

3. Elements of epidemic dis. Control:

① Control the Source of pathogen "Remove the pathogen".
② Interrupting the transmission sterilize environmental Source of spread, vector Control.
③ Controlling or modifying the host response to exposure: immunize the Susceptible, use prophylactic chemotherapy.

Eradication of Disease "Role of epidemiology"

[1] Case-finding: detect prevalence, incidence rate, C.I, mortality rate ...

[2] Selective slaughter: to infected As to protect others.

[3] Depopulation: occur when a diagnostic test Can't be applied to an affected population in order to carry Selective slaughter, espicially when infection spreads too rapidly.

[4] Quarantine measures: according to diseases of OIE lists A & B.

[5] Mass TTT: after application of successful mass detection techniques.

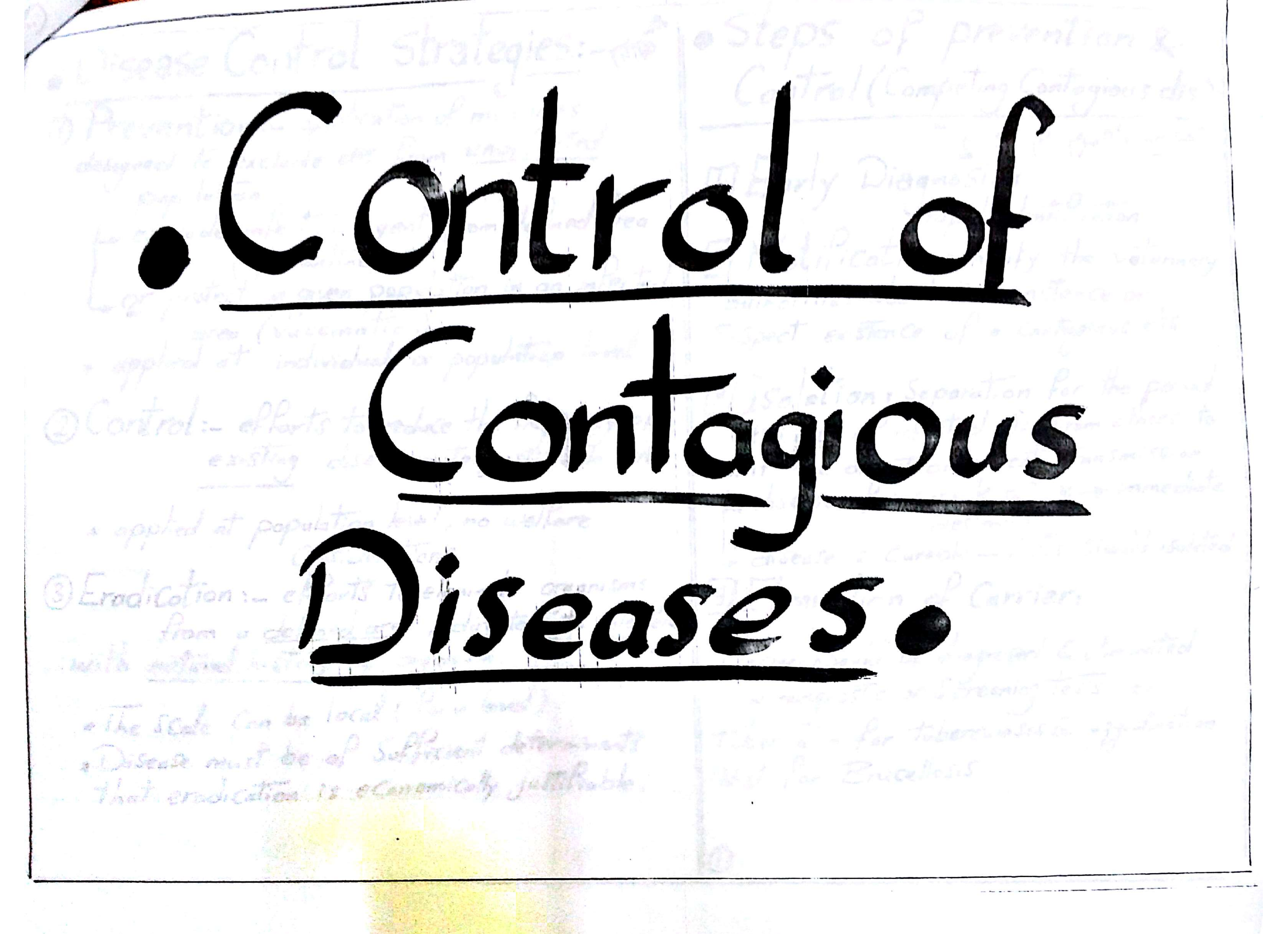
[6] Mass Immunization: one of most effective procedures, part of biosecurity programms.

[7] Environmental Control: Using clean water, adequate Ventillation & lighting, shelter, measures of waste disposal, Pasture rotation.

[8] Biological Control: Using natural enemies to Control unwanted spp., as: use of myxomatosis virus against rabbit pests.

[9] Vector & Reservoir Control: used against infections with their reservoir in domestic As and wild As reservoirs may be found some Complications of epidemiological approach.

Dr. Yomna K. 2017



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• Disease Control Strategies:- مهم

① **Prevention:-** application of measures designed to exclude dis. from unaffected population.

- → exclude infectious agent from defined area (quarantine)
- → or protect a given population in an infected area (vaccination).

* applied at individual or population level.

② **Control:-** efforts to reduce the frequency of existing disease → to justifiable levels.

* applied at population level, no welfare considerations.

③ **Eradication:-** efforts to eliminate organisms from a defined area, directed to interfere with natural history of organism.

* The scale can be local (farm level).
* Disease must be of sufficient determinants that eradication is economically justifiable.

• Steps of prevention & Control (Competing Contagious dis.):

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[1] **Early Diagnosis:** rapid identification

[2] **Notification:** notify the veterinary authorities about the existence or suspect existence of a contagious dis.

[3] **Isolation:** Separation for the period of time of infected A's from others to limit the direct or indirect transmission.

- → disease of incurable nature → immediate destroying.
- → disease is curable → A's should isolated.

[3] **Elimination of Carrier:**

Carrier should be diagnosed & eliminated using diagnostic or screening tests as: tuberculin for tuberculosis & agglutination test for Brucellosis.

5 Monitoring & Surveillance of infection:- ٢١١٥**

It means Collection, analysis, interpret of data.

Passive Surveillance	Active Surveillance
* gathers dis. data from all potential reporting health Care workers.	* provide Stimulus to health Care workers in the form of individual feedback.
* not Stimulate reporting, not provide feedback to individual health workers.	* require more time & resources than passive
* Most Surveillance for Communical dis. is passive	* often used with Suspected outbreak.
* Periodical Collection from health facilities but little attention is given.	* Community health workers → do active Case finding to detect Cases not Come for treatment

6 Quarantine:- ٢١١٥**

* Def. restrict movement of well Às exposed to risk of infection for a period of time not longer than I.P of dis.

* Aims : 1- give time to Contagious dis. in latent phase to become active.
  2- limit the introduction & spread of dis.

* Classification (acc. to location):

1- International: at the ports bet. borders of Countries.

2. Interprovincial: between states, provinces & governorates.

3. Local: inside the province or governorate.

(I) Measures taken for Imported Às:

* Generally, they must have the official health Certificate which Contain:

1. Stamped by the governmental Stamp.
2. Contain the name & address of Sender & reciever.
3. Results of required test with dates & vaccines.

① Cattle (for Breeding Purposes):

1. Country of origin must be free from plague & CBPP.

2- Area from A's derived → free from FMD & Cattle plague for at least 6 m. prior exportation & the imported vaccinated against FMD strains A&C.

3- A's tested within 15 d. prior exportation for T.B, Brucella, Trichomoniasis.

② Cattle (for slaughtering) "Calves":

1- accompanied by Veterinary Sanitary Certificate (VSC).
2- Castrated, not more than 2 Y. old
3- Transported from Country without stopping.
4- examined clinically on ship at arrival.
5- kept in quarantine till slaughter.

③ Sheep & goats (for breeding):

1- Free from (Cattle plague, CBPP, Anthrax & FMD) within 6 m. before exportation.
2- Tested within 30 d. before export against brucellosis.
3- Vaccinated against FMD (A&C).
4- Herd free from Vibriosis, Trichomniasis, blue tongue, John's, Coccidiosis, psudo-T.B, liver flukes.

④ Equines:

1- VSC.
2- Countries free from glanders, Strongles, Equine plague, Equine encephalomyelitis within 60 d. prior exportation.
3- Malline test → -ve.
4- Vaccinated against Equine plague (not less 21 d. & not more 6 m.) before exportation or vaccinated & isolated at arrival.
5- A's in quarantine for 21 d.

⑤ Poultry:

1- Flocks free from pullorum dis, fowl plague, ND, leukosis, fowl cholera. fowl pox (60 d.)
2- Country must be free from Infectious & Contagious diseases.

(II) Measures taken at arrival of Imported A's:

1- Vehicle of transportation, be sure of VSC.
2- P.M examination for dead A's & hygienic disposal of Carcass.

3- Vet. authorities determine if imported As are vaccinated, treated slaughtered or destroyed.

4- Imported beef cattle → slaughtered at the nearest slaughter house, at the same day of arrival or after a period decided by the vet.

5- Milk from As during quarantine period must be boiled before consumption.

** Quarantine Duration:
1- 30 d. (at minimum).
2- If additional As introduced → 30 days must begin again.

[7] Vaccination:

↳ Preventive vaccine: keep As healthy & has no harmful effect on products.

↳ Vaccine for dis. control: In the case of highly infectious dis. as CSF & FMD. emergency vaccination used as control measure.

Ring Vaccination (Protective)	Blanket vaccination (Mass)
* Rapid creation of immune belt around an infected area or in situations where effectiveness of other methods → not sufficient. * width of belt: 20-50 km * ideally be completed within a week.	* Comprehensive vaccination of all susceptible spp. over a larger area. * when outbreak well established * Cover known & suspected infected areas. * Movement of vaccinated As should be regulated

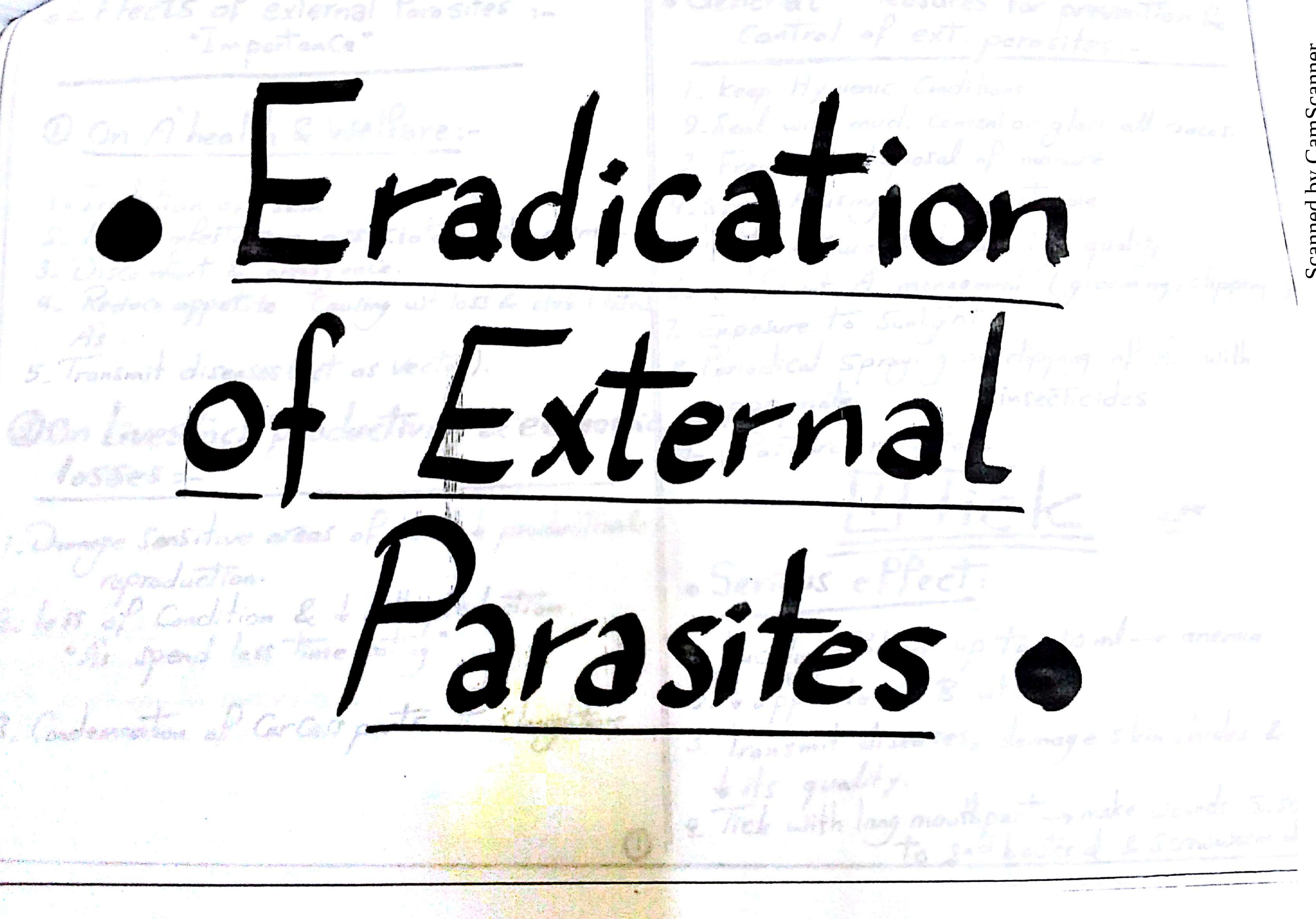
[8] Prophylactic measures:-

all hygienic & sanitary particles applied when handling livestock health problem. Including:-

① Removing potentially contaminated materials.
② Preventing the feeding of contaminated material to livestock.
③ Avoiding contact between infected & susceptible As.
④ Reducing access of vectors to susceptible As.

[9] Disinfection:-

of premises, equipment, vehicles to prevent spreading of dis. during outbreak.


• Eradication
of External
Parasites •

• Effects of external Parasites :- "Importance"

① On À health & Welfare :-

1- Irritation of skin.
2- Heavy infestation associated with anemia.
3- Discomfort & annoyance.
4- Reduce appetite Causing wt. loss & debilitated Às.
5- Transmit diseases (act as Vector).

② On livestock productivity & economic losses :-

1- Damage Sensitive areas of skin, ↓ production & reproduction.
2- loss of Condition & ↓ milk production. "Às spend less time eating".
3- Condemnation of Carcass parts at Slaughter.

• General Measures for prevention & Control of ext. parasites :-

1- keep Hygienic Conditions.
2- Seal with mud, Cement or glass all cracks.
3- Frequent disposal of manure.
4- Spray housing with pesticide.
5- Make Sure feeds are high quality.
6- Efficient À managment (grooming, clipping..)
7- Exposure to Sunlight.
8- Periodical spraying or dipping of Às with appropriate insecticides.
9- Pasture rotation.

[1] Tick

• Serious effect :

1- Suckling Blood up to 10 ml → anemia
2- ↓ appetite, ↓ B. wt.
3- Transmit diseases, damage skin, hides & ↓ its quality.
4- Tick with long mouthpart → make wounds Susceptible to 2nd bacterial & Screwworm infestation

- **Tick life Cycle:**
  - depend on one, two or three host.
  - length varies acc. to season.
    - ↳ ↑ temp. & humidity → Short life cycle (40 d. in Summer & 3m. in winter).
  - Present at areas around the head, in the ears, on the shoulders, neck, tail, bet. hind legs, highly vascularized areas of skin (tail, udder).

- **Control :-**

ⓐ On pasture:

1- Direct way: taking A's away from infested pasture, females on the ground will die.

2- Indirect method (Rotational grazing): pasture divided into 2 parts (A&B), allowing A's to one division then treat A's by spraying, dipping at 10 d. interval.

ⓑ On Stable:

1- Removal of wastes.
2- Cleaning & disinfestation.
3- Special attention to cracks or fissures.

ⓒ On the animal:

(1) Short term remediation: directed against parasitic stages of ticks.
- ↳ Chemical Control for all stages of tick life cycle (nymph, larva, adult)
- ↳ dipping or pour-on (direct application of pesticides)
- ↳ Leave some remidant of insecticide on the body of A.

(2) Long term reduction of tick population.

** If the used insecticide become resistant, you should do:

1- Frequent application of insecticides.
2- Change the type of insecticides.
3- Depopulation
4- Using of alternative methods of tick Control as neem plant & entomopathogenic fungi.

→ Pasture burning (all stages of ticks dead).

2 Mites "Mange"

* less than 1mm in Size.

• **Control** :- Rx

① **Rabbit**: Drug of used is Ivomectin but by the time → A` become resistant & manual III is needed which done by Bayticol (1 cm / 1 Lit. water) → in a bucket using a rubber and clean the cages & the rabbits (espicially at nose, legs, between claws & under the tail).

② **Sheep**:

1. Notification to veterinary authorities.
2. Isolation: Separate infested A's & treated.
3. Inspection of imported & newly purchased A's frequently.
4. General hygienic measures:
   - all bedding from infested premises should be wetted with petroleum & burnt.
   - Diseased A's should be treated by: "using soft water"
     - Dipping: Gammatox paste dip 0.2% (for Sarcoptic mange)
     - Spraying: Diazenon 0.1%.
     - Injection: Ivomec S/C (1ml / 50kg)
     - Pour on: Bayticol (1ml / 20kg)
   - Sheep should be sheared before dipping & the wool must be burnt.

3 Lice

• **Transmit** Endemic typhus fever & Rocky mountain fever diseases.

• **Control** as general p.1

4 Flies & Mosquitoes

• Puplic Health importance :

1- Nuisance of À.
2- Spread diseases between Às Such as 3 day Sickness & RVF.

P.↓ ← general ال +

• Control :-

1- proper Sanitation to ↓ fly breeding sites.
2- Remove manure.
3. Good drainage esp. for damp areas to stop breeding of mosquitoes.
4. Treat skin wounds by sprays & aerosols.

• Blow fly strike (Screw worm) (Myiasis) : مهم *

It is a Condition Caused by maggots on the skin & fur of À, its larva can penetrate any site of À. Treated by Clip & clean Coat around the affected area, remove maggots, treat with insecticides (cream, powder or spray). À may need treatment with antibiotics.

• Methods of application of Insecticides :-

① **Dipping Vat:** deep long trough, from Concrete with ladder, filled with insecticides & Às are forced to swim through it.

** Precautions:
1- Done at early morning
2. Not thirst Às
3- Prefered at rains.

** Advantages: 1- Treating large no. of Às.
2- all body parts Covered with chemical soln.

② **Spraying:** in Small to medium size population, used for ticks, lice & flies.

↳ Spray races: room with perforated pipes → spray insecticide on Às.
* quick than dipping but not reach all parts of the body or penetrate along hair.

↳ Hand Spraying.
↳ Power Spraying.

③ Pour-on:**

dipping Compounds which are applied on a specific region of A', such as along the backbone starting from dorsal midline from neck to base of tail.

** Spots-on : only on the affected parts.

④ Injection:

as Ivomac, S/C (1ml / 50 kg).

⑤ Ear tags:**

plastic tags impregnated with insecticides that are fixed to the ears of Cattle → Control ear tick & horn flies.

• Integrated Pest Managment (IPM) :-

** صبر مهم **

• Def.

- Integrated: focus on interactions of pests, crops, env. & Various Control methods
- Pest: Organism that conflict with our profit, health or Convenience.
- Managment: way to keep pests below the level where they can cause economic damage (not eradicate).

• Has 4 Components:

1. Detection & monitoring Pest proplems.
2. Identifying the pest.
3. Method Selection for the best pest managment.
4. Evaluating the program.

• Importance:

① Help to keep a balanced ecosystem: Chemicals destroy certain spp., Pesticides kill beneficial insects.

② Pesticides can be ineffective: Pests can become resistant. Pests may survive in situations where chemicals not reach (washed off, applied in improper rate or improper life stage of pest).

③ Can save money: avoid economic losses by pests & prevent unnecessary pesticide expense.

④ Promote a healthy environment: keeping adverse effects of chemicals to minimum.